RUTGERS

Video-Based Deception Detection using Visual Cues

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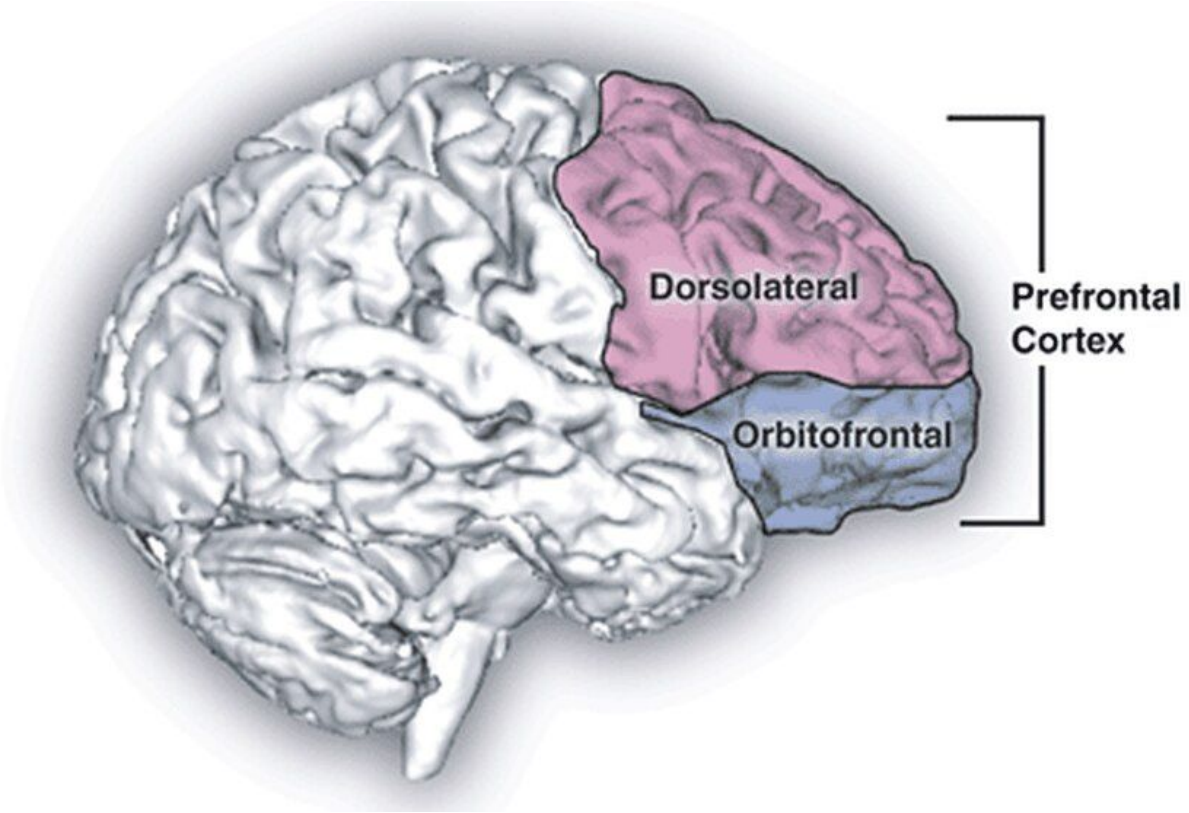
The act of deception is probably as old as civilization, not long after humans began communicating, they began communicating lies.

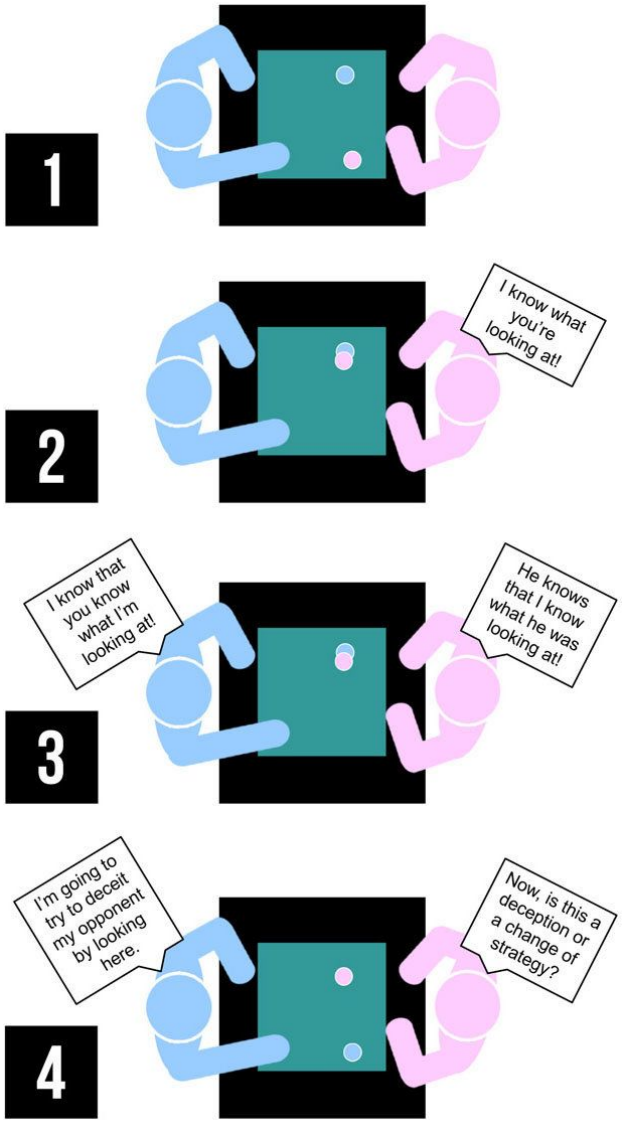


Objective

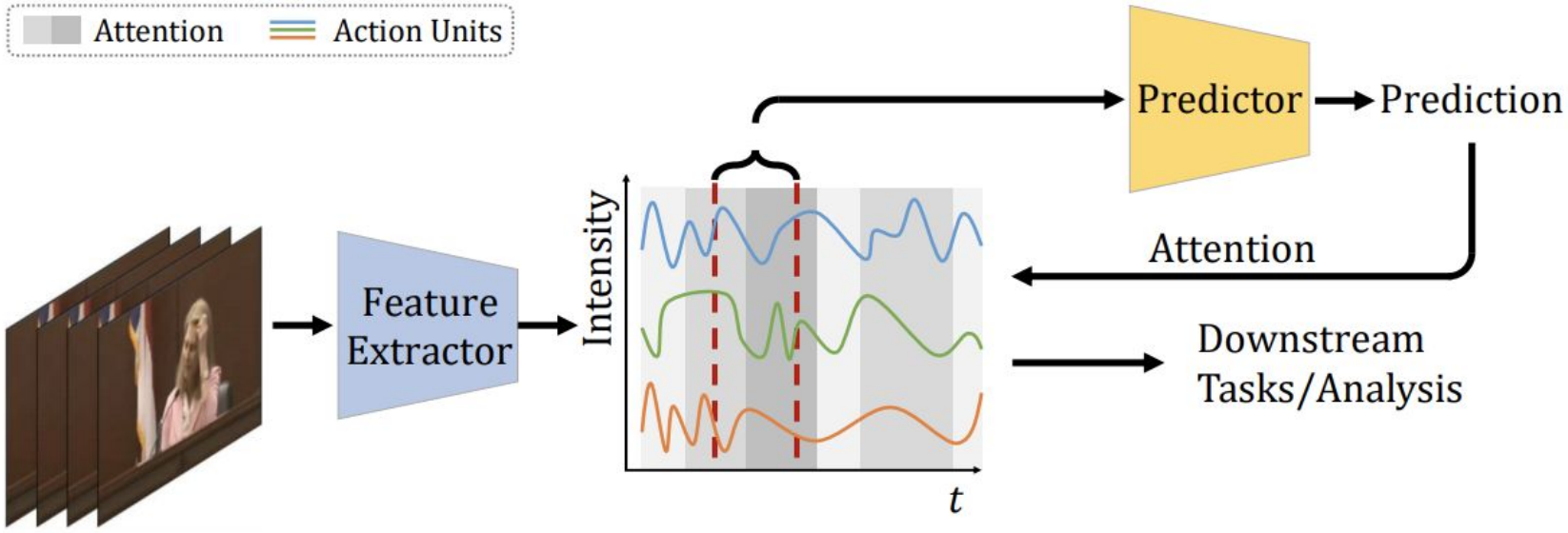
The *Resistance Game*, a social role-playing game that involves deductive reasoning.

- Spy → Deceptive
- Villager → Non-Deceptive

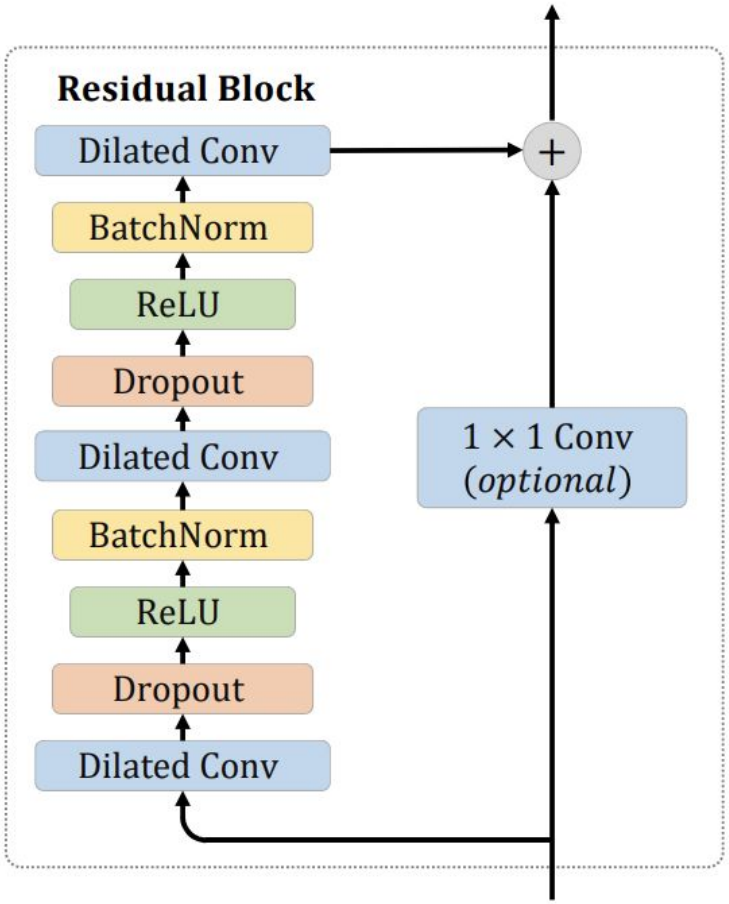
Develop models and run experiments to classify different personas in the *Resistance Game* as Spy or Villager.



Stathopoulos et al. (2020) - FAU Waveforms



Stathopoulos et al. (2020) - Classification



Dataset - *Resistance Game*

- consists of 3280 csv files that contain 17 visual cues (raw pose, gaze, FAU) extracted from videos using OpenFace

- file naming scheme is "game_player_round_moment_role"
  - game: unique identifier of the game played
  - player: unique identifier of player in the game
  - round: round number of the game
  - moment: identifier of the critical decision point
  - role: label in {villager, spy}

Modifications to the Dataset

Previously:

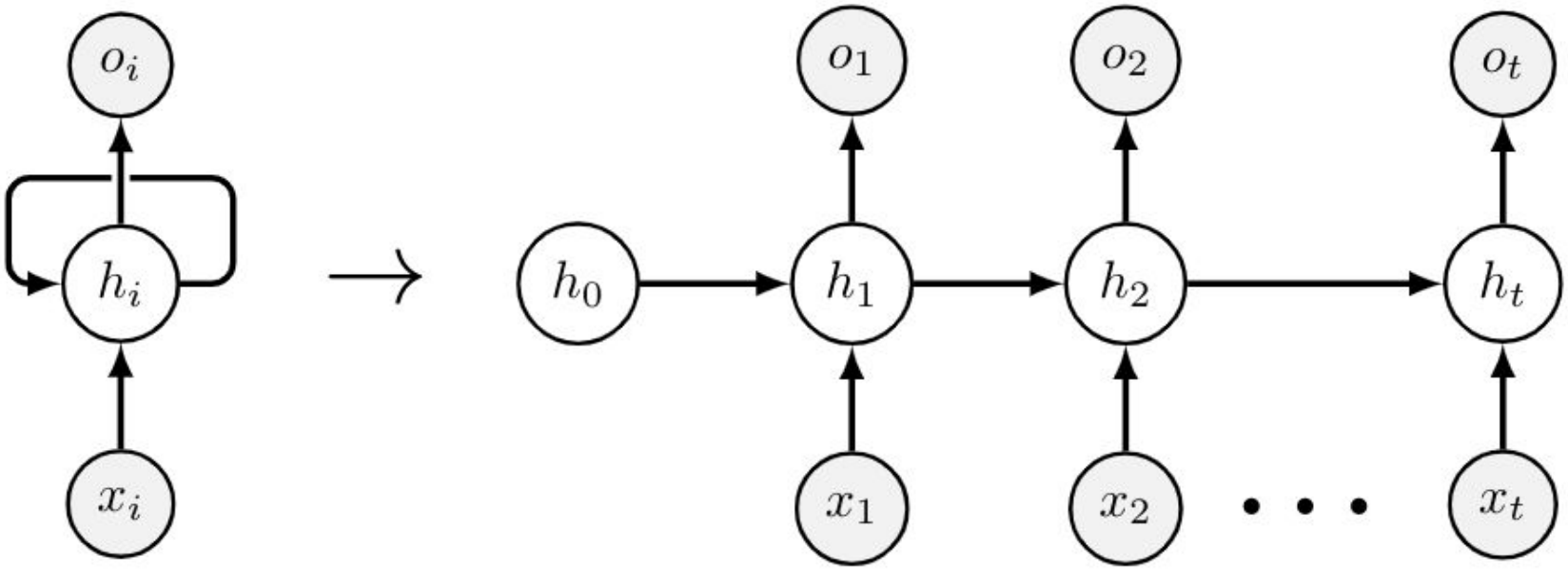
- videos used are very long (average duration is 46 minutes)
- contained only 1 label each → made learning procedure hard

Now:

- videos are 8s (around important timesteps of the game)

Hypothesis: Modifications will help yield better results.

Sequence Model



How the models process the input

Results

Table 1: Results of LSTM model on the Resistance Game Dataset

Aggregation	AP	TP	FP	FN	TN	ACC
Average	44.45	26.0	33.0	211.0	313.0	58.15
Max	45.67	5.0	8.0	232.0	338.0	58.83
Last	42.11	167.0	221.0	70.0	125.0	50.09

Table 2: Results of GRU model on the Resistance Game Dataset

Aggregation	AP	TP	FP	FN	TN	ACC
Average	42.78	194.0	276.0	43.0	70.0	45.28
Max	42.75	195.0	262.5	42.0	83.5	47.77
Last	42.94	186.5	237.5	50.5	108.5	50.60

Results (cont'd)

Table 3: Results of TCN model on the Resistance Game Dataset

Aggregation	AP	TP	FP	FN	TN	ACC
Average	44.82	187.0	241.0	50.0	105.0	50.09
Max	44.17	191.0	243.0	46.0	103.0	50.43

Table 4: Comparative results on the Resistance Game Dataset

Method	AP	TP	FP	FN	TN	ACC
LSTM (Ave)	44.45	26.0	33.0	211.0	313.0	58.15
LSTM (Max)	45.67	5.0	8.0	232.0	338.0	58.83
LSTM (Last)	42.11	167.0	221.0	70.0	125.0	50.09
GRU (Ave)	42.78	194.0	276.0	43.0	70.0	45.28
GRU (Max)	42.75	195.0	262.5	42.0	83.5	47.77
GRU (Last)	42.94	186.5	237.5	50.5	108.5	50.60
TCN (Ave)	44.82	187.0	241.0	50.0	105.0	50.09
TCN (Max)	44.17	191.0	243.0	46.0	103.0	50.43

Conclusions

The data provided is insufficient to classify with high accuracy.

Further Improvements:

- Run same models on more data to increase training, accuracy and average precision
- Consider:
  - round: round number of the game
  - moment: identifier of the critical decision point
- Involve more features (and other high-level features)

Codebase

https://github.com/madhusivaraj/cbim_muri

Acknowledgments

Thank You!